

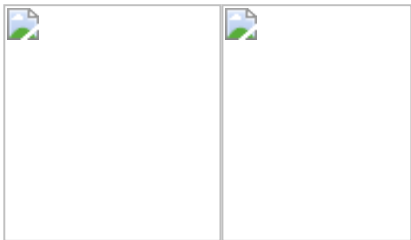
Convergent Technologies: The Risk To Privacy and Security

By: Paul Rubell

This article discusses convergence, and analyzes its impact on privacy rights and security concerns.

The convergence of technologies will bring instant communication and immediate computing power into everyone's lives. Convergence will mean communication free of constraints and limitations.

Convergence is futuristic, but one facet of convergence is almost upon us. The world's telephone networks are about to be linked with the Internet computer network. A message sent to convergent networks will be capable of being transmitted to any person, no matter where the recipient is located at the time, no matter what the format or medium of the message.



Imagine having a single identifying name or number that is the only way to contact you. Imagine a single contact point for all your telephone numbers, e-mail addresses, wireless numbers, fax, website, and instant messenger applications.

ENUM is a numbering protocol. ENUM is a global initiative that will allow telephone numbers to be mapped to Internet addresses^{[\[i\]](#)}. ENUM is a way to dial a telephone number to access Internet services. Convergence addresses the problem of phone calls (or data transfers) that originate on the phone network, but cannot communicate with the Internet.

ENUM will promote the seamless integration of phone and computer networks. Walkie-talkies did not morph into cellular phones until they could be integrated with the phone network. Similarly, ENUM's single-point-of-contact approach links the phone network with the Internet, creating more powerful communications.^{[\[ii\]](#)} Convergent applications will abound, augmenting existing ways of communicating.

Today's already-popular Voice Over IP (VoIP) technology will blossom in an ENUM environment. Phone calls will be made over the shared phone-Internet network.

Similarly, Internet-enabled fax machines (IP fax) will be able to communicate by fax or e-mail. The distinction between transmitting via phone lines and transmitting via the Internet will blur and fade away.

E-mail will become a universal application that can be sent to a telephone over the Internet. E-mail will be delivered to the single-point-of-contact ENUM number.

Instant messaging will transcend chat rooms. A single-point-of-contact number could be reached through many types of media.

Unified messaging (e-mail and voicemail messaging) would become simple, and messages could be accessed from anywhere in the world.

Convergence of technologies is unstoppable. ENUM is designed to take advantage of convergence. The Internet and telephone industries are being presented with a great opportunity.

Risks to privacy

ENUM poses serious risks to individual privacy rights. ENUM could be used to trace and track people, and to create a dossier about them.

In the opinion of this author, too little attention has been focused on the threat to privacy by the convergence of technologies.

ENUM involves mapping unique, personally identifiable contact information to a single database. Who will have access to this confidential information?

The ENUM phone book could become the ultimate marketing database, containing public and private information about a person in one place. A combined telephone/Internet address book could be very powerful and potentially dangerous tool.

ENUM will be a public database. ENUM's openness is intended to foster communication. But with openness comes the specter for abuse.

Our privacy rights may become diluted, as each of us becomes identified by a unique ENUM number. Who we are, where we are, what we do, will become known to the caller, the sender, and anyone else who is watching. Each time an ENUM number is called, personally identifiable information about the recipient will be transmitted, susceptible to capture by others. Our personal information will become transparent to law enforcement, hackers, and voyeurs alike. The public ENUM database will be searchable by anyone. It will become mother's milk for data-miners (like marketers, spammers, and the malicious).

ENUM numbers and their related databases will tell a detailed and confidential story, for those who know how to read the data.

ENUM's proponents contend that privacy protection is easily available to protect users, by opting-out. Opting out (in the opinion of this author) makes no sense, as a solution to this privacy riddle. To refuse to participate in ENUM, in the coming convergent world, is to opt out of phone service, e-mail, fax, or cell phone service alike. One should not have to become an ostrich, in order to be safe from intrusion while communicating.

It is imperative, before ENUM is deployed, that legal precautions and technological security provisions are taken. The uniquely private information to be contained in the ENUM database will need to be protected and kept secure. This can be accomplished in a number of ways.

First, end-user agreements need to be in place, to ensure the privacy of users. Users are entitled to know their rights, and to restrict via contract law the ways that their confidential information will be used. Second, meaningful privacy policies need to be adopted by carriers and service providers, identifying when and how they will grant access to the ENUM database to third parties. Third, use limitations need to be imposed, to protect personally identifiable information from being

used for unrelated purposes. Fourth, statutes need to be adopted, to protect against law enforcement's inspection of ENUM data without judicial oversight. Fifth, there are also national security and homeland defense aspects to the data-collection efforts that will become ENUM.

Security risks

Marketers are not the only cause for concern about a single point of contact for each person (although the potential for increased spam mail is apparent). More malicious uses could be made of the ENUM database of phone/Internet numbers. Hackers could cause more damage in the future than today, because once a user's ENUM database has been hacked, a wide range of confidential information about the user will be obtained.

Denial of service attacks would be even more drastic in their impact, in the ENUM world. If a user is disconnected from the converged network, she will lose the ability to communicate altogether, by phone or Internet.

There are technological ways of protecting the reliability and accuracy of data in an ENUM communication, such as encryption and digital signatures. There are also physical ways of securing the information, such as restricting access to portions of the database.

Before ENUM is deployed, the integrity and security of the information needs to be assured.

Number Portability

Number portability means that you can take your phone number with you when you change cellular carriers.

Number portability is designed to afford a choice to consumers of communications services, and to increase competition among service providers.

Number portability is a 'hot' issue in the telecommunications world, and is briefly discussed in this article. But significantly, the advent of ENUM numbering raises concerns about number portability.

Portability means a number of different things, depending on the circumstances. Phone numbers can be portable when users change service providers, when users relocate, and when users change the type of phone or Internet service.

With the converging phone and Internet, customers will be able to select among phone and Internet service providers. Under ENUM, customers could retain their phone numbers when they switch phone carriers. They could similarly keep their ENUM numbers when they change ISP's.

Service provider portability is a regulatory initiative in many countries around the world. Local phone number (wireline) portability has been the law in the United States since 1996. However, the portability of cellular phone numbers is not mandated in the United States at this time. In July 2002, the Federal Communications Commission (FCC) deferred until November 2003, the obligation of cell phone carriers to make their numbers portable for their customers. (This was the third instance since 1998 that the FCC has deferred implementation of wireless number portability.)

The mobile carrier industry is soundly opposed to number portability. In the United States, large telco carriers have opposed the implementation of wireless portable phone numbers. They lobby that the cost of implementation is too great, and that it encourages consumers to "churn," or change service frequently.

Despite industry opposition, Australia deployed wireless phone number portability in September, 2001. By all accounts, it has been a success there. Australia should be a model for America.

Today in Australia, cell phone customers can switch their mobile carriers, without losing their cell phone numbers^[iii]. This ability is a watershed in the world of cellular communications.

ENUM is a Portable and Unique Identifying Number

ENUM is a unique number that identifies us. Number portability will make communications even more widely available.

ENUM will cut across the traditional nomenclature landscape. Lawyers accustomed to resolving domain name disputes in the ICANN^[iv] forum will find themselves wrestling over the right to use ENUM numbers in a new forum.

Traditionally, phone numbering has been tightly regulated by governments. In contrast, Internet addresses have been loosely organized and administered.

Because ENUM is the point where the phone and Internet converge, it presents a challenge to both phone and Internet naming protocols.

A solution to the numbering conundrum has been proposed by the Internet Engineering Task Force (IETF). Under the proposal^[v], the International Telecommunications Commissions (ITU), a global association, will resolve cross-border name disputes, and intra-national disputes will be resolved locally, in accordance with national law.

With the advent of convergent technologies, it will become easier to communicate. Unless deployed with great care, convergence will also result in the loss of privacy rights. Law enforcement, commercial marketing ventures, and hackers will all benefit from ENUM and portable numbers, unless legal precautions are used in tandem with the roll-out of exciting new technologies.

^[i] Single numbering technology is currently being developed. The Internet Engineering Task Force (IETF) has chartered a working group to map telephone numbers to Internet Protocol (IP) addresses.

^[ii] "ENUM – Mapping the E.164 Number into the DNS," *The Internet Protocol Journal*, June 2002, Vol. 5, No. 2.

^[iii] Telephone Numbering Plan 1997, as amended, made under Section 455 of the Telecommunications Act 1997, located at <http://www.aca.gov.au/number/plan/plan97consoln.pdf> (last viewed December 16, 2002).

^[iv] The Internet Corporation for Assigned Names and Numbers.

[v] International Telecommunication Union, Telecommunication Standardization Bureau, *TSB Circular 72* (23 November 2001).

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